

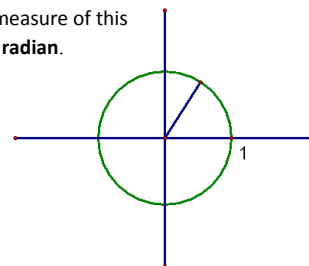
Radians

A radian is defined using the unit circle, which is a circle with a radius of 1 unit centered at the origin. When a central angle intercepts an arc that has the same length as a radius of the circle, the measure of this angle is defined to be one **radian**.

$$C = 2\pi$$

$$2\pi = 360^\circ$$

$$\pi = 180^\circ$$



The circumference of a circle is $2\pi r$, where r is the length of a radius. There are 2π radians in one complete revolution about a point and one complete revolution equals 360° .

$$2\pi \text{ radians} = 360^\circ \quad \pi \text{ radians} = 180^\circ \quad 1 \text{ radian} \approx 57.3^\circ$$

Convert each degree measure to radian measure.

a. 120°

$$120^\circ \cdot \frac{\pi}{180^\circ} = \frac{2\pi}{3}$$

b. -245°

$$-245^\circ \cdot \frac{\pi}{180} = -\frac{49\pi}{36}$$

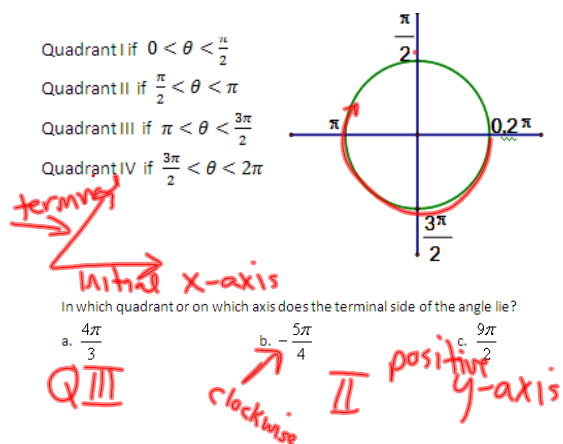
Convert each radian measure to degree measure.

a. $\frac{\pi}{3}$ radians

$$\frac{\pi}{3} \cdot \frac{180}{\pi} = 60^\circ$$

b. $-\frac{3\pi}{4}$ radians

$$-\frac{3\pi}{4} \cdot \frac{180}{\pi} = -135^\circ$$



$$1 \text{ minute } (1') = \left(\frac{1}{60}\right)^\circ \quad 1 \text{ second } (1'') = \left(\frac{1}{60}\right)' \text{ or } \left(\frac{1}{3600}\right)^\circ$$

Convert each angle measure as indicated.

a. $12^\circ 46' 4''$ to degrees, minutes and seconds, to the nearest second.

$$\begin{aligned}
 &\text{Minutes: } 46 \cdot 60 = 2784' \\
 &\text{Seconds: } 4 \cdot 60 = 240'' \\
 &12^\circ 27' 50''
 \end{aligned}$$

b. $23^\circ 42' 45''$ to decimal degrees, to the nearest tenth.

$$23 + \frac{42}{60} + \frac{45}{3600} = 23.7^\circ$$

$$23.42^\circ$$

$$.42 \times 60 = 25.2'$$

$$.2 \times 60 = 12''$$

$$23^\circ 25' 12''$$